

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Inventor : PIETIG

Application No. : 10/538,580

Filed : 06/15/2006

For : NON-RECIPROCAL CIRCUIT ELEMENT

APPEAL BRIEF

On Appeal from Group Art Unit 2817

Date: 2/4/2008

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RELATED PROCEEDINGS

EVIDENCE

TABLE OF CASES

NONE

I. REAL PARTY IN INTEREST

The real party in interest is NXP B.V., the successor in interest to the present assignee of record of the present application, Koninklijke Philips Electronics N.V., and not the party named in the above caption.

II. RELATED APPEALS AND INTERFERENCES

With regard to identifying by number and filing date all other appeals or interferences known to Appellant which will directly effect or be directly affected by or have a bearing on the Board's decision in this appeal, Appellant is not aware of any such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-8 are pending, of which claims 6-8 have been withdrawn from consideration. Claims 2, 3 and 5 are objected to. Claims 1 and 4 stand finally rejected and form the subject matter of the present appeal.

IV. STATUS OF AMENDMENTS

All amendments have been entered. No amendment after final rejection has been submitted.

V. SUMMARY of the CLAIMED SUBJECT MATTER

The present invention relates to non-reciprocal circuit element such as a circulator, i.e., a passive electronic component three or more ports in which the ports can

be accessed in such a way that when a signal is fed into any port it is transferred to the next port only, the first port being counted as following the last in numeric order. When one port of a three-port circulator is terminated in a matched load, it can be used as an isolator, since a signal can travel in only one direction between the remaining ports.

The invention relates particularly to a non-reciprocal circuit element formed of conductors embedded in a multilayer core of ferrimagnetic material and arranged in superposed conductor planes such that conductor elements that cross over in a cross-over area. At least in the cross-over area, the core comprises hard magnetic material permanently magnetized in a direction perpendicular to the conductor planes.

The following analysis of independent claim 1 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
1. A non-reciprocal circuit element having	FIGS. 1-3: 1	Page 5, line 19, to page 6, line 7.
a plurality of strip conductor elements (2) insulated electrically from one another,	FIGS. 1-3: 2	Page 5, line 19, to page 6, line 7.
which conductor elements are embedded in a multilayer core (3) of ferrimagnetic material	FIGS. 1-3: 3	Page 5, line 19, to page 6, line 7.
and are arranged in superposed conductor planes in such a way that the conductor elements (2) cross over one another in at least one crossover area (4, 5),	FIGS. 1, 2: 4, 5	Page 5, line 19, to page 6, line 7.
characterized in that the core (3) comprises, at least in the area (4, 5) where the conductor elements (2)	FIGS. 1, 3: 3	Page 5, line 19, to page 6, line 7.

cross over one another, hard magnetic material, which is permanently magnetized in a spatial direction perpendicular to the conductor planes.		
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VI. GROUNDs of REJECTION to be REVIEWED ON APPEAL

The issues in the present matter are whether:

1. under 35 USC 103, claims 1 and 4 are unpatentable over Marusawa in view of Maruhashi.

VII. ARGUMENT

I. Rejection of Claims 1 and 4 as Unpatentable Over Marusawa in View of Maruhashi

Marusawa shows an example of the prior art described in the Background portion of the specification, in which a non-reciprocal circuit element is produced from ceramic substrates (in particular, sinterable foils) in a conventional multilayer technology. Soft magnetic material of a core is magnetized by two permanent magnets arranged above and below the core. The entire arrangement is surrounded by a metallic housing, which serves as a magnet yoke.

Maruhashi describes quite a different arrangement. The circuit element of Maruhashi is not formed from a series of substrates using multilayer technology. Rather, in Maruhashi, a ferrite is embedded into a single substrate. An electrode pattern is formed on top of the ferrite and the substrate. Ordinarily, a magnet is positioned above the ferrite. However, Maruhashi teaches that the ferrite may be formed of a hard ferrite material such that the external magnet becomes unnecessary.

Applying a similar substitution to the primary reference Marusawa would not have been obvious to one of ordinary skill in the art. In particular, neither reference teaches or suggests a specific hard magnetic material suitable for use in the fabrication technique of Marusawa in which the magnetic material would be applied as a sinterable foil in the course of fabrication in like manner as layers of other materials. There is no evidence that such a hard magnetic material, capable of being worked in this manner, would have been known to or readily ascertainable by one of ordinary skill in the art.

To draw an analogy, the bodily insertion of a discrete resistor or discrete capacitor into an integrated circuit would not be obvious—because it is unworkable. The use of integrated resistors and capacitors in an integrated circuit is obvious because these structures are known. In like manner, the bodily insertion of a separately formed hard magnet into the apparatus of the primary reference would not have been obvious because it is unworkable. Furthermore, there is no teaching of record that a suitable technique for forming a sinterable foil of hard magnetic material was known.

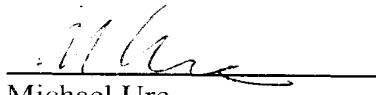
With regard to dependent claim 4, it depends from independent claim 1, which has been shown to be patently distinguishable over the cited reference. Accordingly, it is also patently distinguishable and allowable over the cited references by virtue of their dependency upon an allowable base claim.

In view of the above, applicant submits that all of the above referred-to claims are patentable over the teachings of the cited references.

VIII. CONCLUSION

In view of the above analysis, it is respectfully submitted that the referenced teachings, whether taken individually or in combination, fail to anticipate or render obvious the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

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IX. APPENDIX: THE CLAIMS ON APPEAL

1. A non-reciprocal circuit element having a plurality of strip conductor elements (2) insulated electrically from one another, which conductor elements are embedded in a multilayer core (3) of ferrimagnetic material and are arranged in superposed conductor planes in such a way that the conductor elements (2) cross over one another in at least one crossover area (4, 5), characterized in that the core (3) comprises, at least in the area (4, 5) where the conductor elements (2) cross over one another, hard magnetic material, which is permanently magnetized in a spatial direction perpendicular to the conductor planes.
2. A non-reciprocal circuit element as claimed in claim 1, characterized by an upper and a lower outer layer (7, 8) of soft magnetic material.
3. A non-reciprocal circuit element as claimed in claim 2, characterized in that the upper and/or lower outer layers (7, 8) are separated from the core (3) each by an electrically conductive separator layer (14).
4. A non-reciprocal circuit element as claimed in claim 1, characterized in that the conductor elements (2) cross over one another in pairs at an angle of 120.degree..
5. A non-reciprocal circuit element as claimed in claim 1, characterized by two spatially separate crossover areas (4, 5) of the conductor elements (2), the hard magnetic material

of the core (3) being oppositely magnetized in the respective crossover areas (4, 5).

6. - 8. (Withdrawn)

X. APPENDIX: RELATED PROCEEDINGS

NONE

XI. APPENDIX: EVIDENCE

NONE